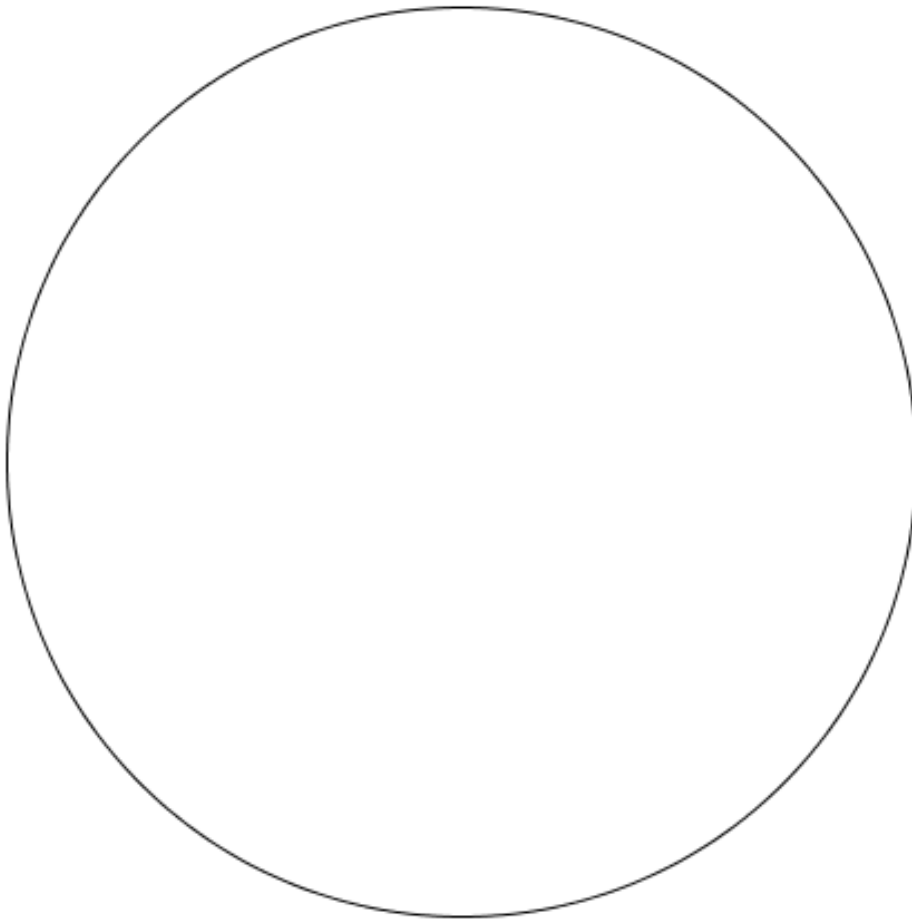


## **Chapter 3 Unit Activity**

For this activity, you will combine some basic geometric principles and your understanding of geometry in the coordinate plane to find the coordinates of the center of a circle.

The perpendicular bisector of any chord inside of a circle will pass through the center of the circle. If we can find the perpendicular bisector of two chords, they will intersect at the center of the circle.

- 1) Draw four points on the circle A, B, C, & D.
- 2) Draw segment AB and segment CD (These are called “Chords”).
- 3) Construct the perpendicular bisector of AB
- 4) Now construct the perpendicular bisector of CD
- 5) Call the point of intersection point Q
- 6) Verify that Q is the center of the circle by tracing the circle with your compass.



Now you will repeat this process inside of the coordinate plane. Use a piece of graph paper and a ruler to draw a coordinate plane that goes out 20 tick marks in all four directions. All of the points listed below lie on circle Q. We will now use these points to find the coordinates of the center of circle Q. Plot and label each of these points on your graph.

- A (-7,-3)
- B (10,4)
- C (17,-13)
- D (10,-20)

- 1) Draw segment AB on your graph. Use the space below to find the slope and midpoint of segment AB. Draw the Midpoint of AB on your graph and call it Point P.

Midpoint of AB\_\_\_\_\_

Slope of AB \_\_\_\_\_

- 2) Remember that we want to find the PERPENDICULAR Bisector of AB. We will call this line PZ (because we know that it will pass through the center of the circle and the midpoint of AB). Find the slope of PZ.

Slope PQ\_\_\_\_\_

- 3) Now that we have the slope of our perpendicular bisector (slope of PQ) and a point that it passes through (Midpoint of AB), find the equation of line PQ. Write your equation with FRACTIONS, NOT DECIMALS!!! Sketch this equation on your graph.

Equation of PQ\_\_\_\_\_

- 4) Now that you have the equation of the perpendicular bisector of segment AB, your job is to repeat this process in order to find the equation of the perpendicular bisector of segment CD (we will call it RQ). Remember to write your equation using only fractions and to draw point R and line RQ on your graph!

Midpoint of CD (Point R)\_\_\_\_\_

Slope of CD \_\_\_\_\_

Slope of RQ\_\_\_\_\_

Equation of RQ \_\_\_\_\_

Name\_\_\_\_\_Period\_\_\_\_\_Date\_\_\_\_\_

Now that we have the equation of our two perpendicular bisectors, we can use these two equations to find the coordinates of the point of intersection (which should be the center of circle Q). Write the equation of line PQ and RQ in the lines below:

Line PQ \_\_\_\_\_

Line RQ \_\_\_\_\_

In the space below, solve the system of equations from above for  $x$  and  $y$ .

$X =$  \_\_\_\_\_

$$Y = \underline{\hspace{2cm}}$$

If you have done this correctly, you should have INTEGER values for  $x$  and  $y$ . Plot this point on your graph and call it point Q. Now verify that point Q is the center of the circle containing points A, B, C, and D by placing the needle of your compass on point Q, the pencil of your compass on point A, and constructing the circle. If you have done everything correctly, your circle should pass through points A, B, C, & D.

**Check for understanding:** In the lines below, give step-by-step instructions on how to find the equation of a perpendicular bisector of any segment in the coordinate plane. Be specific!!!

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.